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22879 7590 08/09/2007 HEWLETT PACKARD COMPANY P O BOX 272400, 3404 E. HARMONY ROAD INTELLECTUAL PROPERTY ADMINISTRATION FORT COLLINS, CO 80527-2400			EXAMINER KRASNIC, BERNARD	
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/696,140	<b>Applicant(s)</b> SAMADANI, RAMIN	
	<b>Examiner</b> Bernard Krasnic	<b>Art Unit</b> 2624	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 08 January 2007.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-31 is/are pending in the application.  
     4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 12 is/are allowed.
- 6) ☒ Claim(s) 1-11, 13-22 and 27-31 is/are rejected.
- 7) ☒ Claim(s) 23-26 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
     a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |  |
|--|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input checked="" type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. <u>20070801</u> |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948)                        | 5) <input type="checkbox"/> Notice of Informal Patent Application  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____   |

### **DETAILED ACTION**

1. The Final Office Action filed by the Examiner on 03/06/2007 has been withdrawn because the Applicants representative, Mr. Edouard Garcia, has showed to the Examiner that claims 17, and 22-27 did not have any art rejections in the Final Office Action filed on 03/06/2007 but were still marked as rejectioned by the Examiner. Since the independent claims had been amended in the Applicants Amendment After Non-Final filed on 1/08/2007, the Examiner still has the opportunity to make this second Final Office Action to correct this complication because the Applicants amendment filed on 1/08/2007 on all the independent claims has brought reasons for new grounds of rejection. Therefore the Applicant will have a period of three months for reply, from the mailing date of this second Final Office Action .

### ***Response to Arguments***

2. The amendment filed 1/08/2007 have been entered and made of record.
3. The Terminal Disclaimer filed 1/08/2007 have been approved, entered and made of record. Therefore, the Examiner has withdrawn the rejections made under the doctrine of Obvious-Type Double Patenting.
4. In response to the amendments filed on 1/08/2007:
- The "Objections to the specification" have been entered and therefore the Examiner withdraws the objections to the specification.

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The "Objections to the claims" have been entered, but the Applicant has not amended a few of the addressed claim objections and therefore the Examiner has once again addressed these issues.

The "Claim rejections under 35 U.S.C. 112, second paragraph" have been entered and therefore the Examiner withdraws the rejections under 35 U.S.C. 112, second paragraph. However, due to the amendment, claims 8 and 27 arise with a 35 U.S.C. 112 second paragraph issue.

5. The Applicant's arguments with respect to independent claims 1 and 28-30 have been considered but are moot in view of the new ground(s) of rejection. The Nosratinia in view of Hallapuro and Winger references, previously used to reject independent claims 1 and 28-30 require a fourth reference Malvar ("Low-complexity transform and quantization in H.264/AVC", this reference was disclosed and used as part of the rejections in the Examiners original Non-Final Office Action) because the applicant has included the further limitation "non-linear" to the independent claims 1 and 28-30 (see Applicants Reply - page 4, line 5 of claim 1, page 8, line 5 of claim 28, line 5 of claim 29, page 9, line 6 of claim 30). Obviously Nosratinia in view of Hallapuro and Winger does not disclose that F specifies "non-linear" mapping from coefficients of D to coefficients of Z, therefore Nosratinia in view of Hallapuro and Winger and further in view of Malvar is used to refute the amended independent claims 1 and 28-30.

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6. Applicant's arguments filed 1/08/2007 have been fully considered but they are not persuasive.

The Applicant alleges, "Nosratinia does not teach or suggest anything ..." in page 12, and states respectively that the amended limitation "nonlinear" mapping is not taught by Nosratinia. The Examiner agrees, however in reply to this amendment to claim 1, the Examiner has used Malvar to reject this further limitation as discussed above and in the 35 U.S.C. 103 rejections.

The Applicant alleges, "Hallapuro only discloses that his approximations ..." and "Thus, neither Nosratinia or Hallapuro provides ..." in pages 12-13, and states respectively that Hallapuro's approximations of the DCT are related to non-compression and also states that the motivation to use Hallapuro is not substantial. However, Hallapuro discloses the motivation that "a good resulting quality can be achieved" using the transform while "requiring less operations" (see Hallapuro, abstract, lines 3-6 and 14-18). Hallapuro also discloses "decompression of compressed digital data" (see Hallapuro, abstract, lines 14-18) and compression is closely related to decompression (they are opposites if a compression and decompression system is to properly function) which would lead one of ordinary skill in the art at the time the invention was made to use Hallapuro to teach the suggested limitations.

The Applicant alleges, "In addition, the Examiner also has not met the second ..." in page 13, and states respectively that there is no reasonable expectation of success. In response to Applicant's argument that there is no reasonable expectation of success, the test for obviousness is not whether the features of a secondary reference may be

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bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

The Applicant alleges, "Contrary to the Examiner's statement ..." in page 14, and states respectively that Winger's block is not a respective quantization value linked to the input image. However, Winger does disclose the block is a respective quantization linked to the input image (see Winger, page 3, paragraph [0033], lines 1-7). The Applicant alleges throughout page 15 and states respectively that there is no sufficient motivation to use Winger's block thresholding process instead of the standard JPEG quantizer where the process is used to "reduce coding artifacts and enhance visual quality". However, Winger discloses "estimation accuracy" in addition to the "improving the rate-distortions" (see Winger, paragraph [0007], paragraph [0009], lines 28-31, paragraph [0017], lines 7-9). The Applicant once again alleges, "Furthermore, the Examiner also has not met the second ..." in page 16, and states respectively that there is no reasonable expectation of success. The Examiner has addressed this similar issue above in a different argument.

The Applicant alleges, "Each of claims 2-5, 8, 13, 15, 16, and 18-21 ..." in page 16, and states respectively that these rejections should be withdrawn due to the applicants arguments and amendment of "nonlinear" mapping toward claim 1.

However, as discussed above and in the 35 U.S.C. 103 rejections, claim 1 even after



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the amendment is still not patentable over the prior art and therefore the rejections on claims 2-5, 8, 13, 15, 16, and 18-21 still remain.

The Applicant alleges, "Claim 8 recites that ..." in pages 16-17, and states respectively that Nosratina doesn't teach the amended "nonlinear" mapping for claim 1 and requests that the Examiner cite prior art for the assertions regarding the motivation for the obvious statement introduced. However, the Examiner feels there is no need to fulfill the request to cite a prior art reference in light of the amended claim 1, because claim 8 now consists of a 35 U.S.C. 112, second paragraph issue as will be discussed in the 35 U.S.C. 112 rejections section of this Office Action,

The Applicant alleges, "Claim 20 recites that ..." in pages 17-18, and states respectively that the Examiner impermissibly has relied on a single element of Nosratina's disclosure to meet two separate elements. However, as can be seen in Fig. 5 of Nosratina as disclosed in the original Examiner's Non-Final Office Action, a spatially forward transform is applied to Nosratina's "Noisy Image" followed by Nosratina's quantizer and finally the combination of inverse transformed images create the output image or Nosratina's "Enhanced image" which is what claim 20 is reciting respectively (see Nosratina, Fig. 5, pages 71-73, section 3.1). Therefore, as the applicant alleges, "Claim 21 depends from claim 20 ..." in page 18, the rejection does still remain for claim 21 over the prior art since claim 20 is still deemed not patentable over the prior art. Similarly, as the applicant alleges, "Each of independent claims 28-30 ..." in page 18, the arguments are moot in view of the new grounds of rejection as discussed above and in the 35 U.S.C. 103 rejections.

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The Applicant alleges, "The Examiner has rejected claims 6, 7, and 9-11 ..." in pages 18-20, and states respectively that the rejections to claims 6, 7, and 9-11 should be withdrawn because claim 1 does not provide for "nonlinear" mapping. However, the arguments for the amended "nonlinear" mapping toward claim 1 are moot in view of the new grounds of rejection as discussed above and in the 35 U.S.C 103 rejections. The Applicant also states respectively that Malvar does not provide proper motivation to substitute Nosratinia's DCT with Malvar's applied teachings of "rounding the scaled entries of the DCT" (see Malvar, page 599, sentence above equation 3) to show the process is used to "reduce coding artifacts and enhance visual quality". However, Malvar discloses improving compression efficiency and improving the PSNR while minimizing the computational complexity (see Malvar, page 599, left col., "For improved compression ...", page 602, left col., "In some applications ...", abstract). The Applicant also states respectively that there is no reasonable expectation of success for Malvar's teachings. The Examiner has addressed this similar issue above in a different argument. In addition, the amendment to claim 9 still contains the features taught by Malvar (see Malvar, page 599, equation 3).

The Applicant alleges, "The Examiner has rejected claim 14 ..." in pages 20-21, and states respectively that the rejection to claim 14 should be withdrawn because claim 1 does not provide for "nonlinear" mapping. However, the arguments for the amended "nonlinear" mapping toward claim 1 are moot in view of the new grounds of rejection as discussed above and in the 35 U.S.C. 103 rejections. The Applicant also states respectively that Merhav does not provide proper motivation to substitute



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Nosratinia's DCT with Merhav's applied teachings of an approximate DCT based on a factorization to show the process is used to "reduce coding artifacts and enhance visual quality". However, Merhav discloses maintaining the images visual integrity and quality while increasing the low cost computational processing speed (see Merhav, col. 7, lines 30-35). The Applicant also states respectively that there is no reasonable expectation of success for Merhav's teachings. The Examiner has addressed this similar issue above in a different argument.

### ***Claim Objections***

7. Claims 18-20 and 31 are objected to because of the following informalities:
- Claims 18-20, line 2 respectively: "inverse transform" should be -- the intermediate images -- as described on page 13, lines 8-11 of the specification.
- Claim 31 [newly added], lines 1-2: "the rounding operator" should be -- a rounding operator --.
- Claim 31 [newly added], line 2: "the coefficient" should be -- a coefficient --.

Appropriate correction is required.

### ***Claim Rejections - 35 USC § 101***

8. Claim 30 is rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. Claim 30 is drawn to functional descriptive

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material NOT claimed as residing on a computer readable medium. MPEP

2106.IV.B.1(a) (Functional Descriptive Material) states:

“Data structures not claimed as embodied in a computer-readable medium are descriptive material per se and are not statutory because they are not capable of causing functional change in the computer.”

“Such claimed data structures do not define any structural or functional interrelationships between the data structure and other claimed aspects of the invention which permit the data structure’s functionality to be realized.”

Claim 30, while defining a “machine-readable medium storing machine-readable instructions for causing a machine to”, does not define a “computer-readable medium” and is thus non-statutory for that reasons. A “machine-readable medium storing machine-readable instructions for causing a machine to” can range from paper on which the program is written, to a program simply contemplated and memorized by a person. The examiner suggests amending the claim to embody the program on “computer-readable medium” in order to make the claim statutory. “A machine-readable medium storing machine-readable instructions for causing a machine to” is suggested to be -- A computer-readable medium storing computer-readable instructions for causing a computer to --.

“In contrast, a claimed computer-readable medium encoded with the data structure defines structural and functional interrelationships between the data structure and the computer software and hardware components which permit the data structure’s functionality to be realized, and is thus statutory.”

- MPEP 2106.IV.B.1(a)

Appropriate correction is required.

***Claim Rejections - 35 USC § 112***

9. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

10. Claims 8, 13 and 27 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Re Claim 8: Due to the amended limitation of "nonlinear" mapping to claim 1, this claim is rendered indefinite because it is unclear how F specifies a non-linear mapping from coefficients of D to coefficients of Z (as recited in claim 1) and also F specifies a linear mapping of coefficients of D to coefficients of Z having values 0 and  $\pm 2^N$  (linear mapping) in the same claim. Having F specifying a non-linear mapping in claim 1 and then having F specifying a linear mapping in dependent claim 8 is contradictory.

Re Claim 13: This claim is rendered indefinite and unclear because there is no antecedent basis for the limitation "weighted by respective scaling factors". It seems this claim should be dependent upon claim 10 instead of claim 9 and if this is the case, original claim 12 and amended claim 13 would be respectively the same. This claim is suggested to be deleted.

Re Claim 27: Due to the amended limitation of "The method of claim 22" to claim 27, this claim is rendered indefinite and unclear because there is no antecedent basis for

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the limitations "the base image contribution" and "the ringing correction image contribution". It seems this claim should be dependent upon claim 26 instead of 22.

Therefore, "The method of claim 22" is suggested to be -- The method of claim 26 --.

Appropriate correction is required.

### ***Claim Rejections - 35 USC § 103***

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

12. Claims 1-11, 15-16, 18-21, and 28-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nosratinia (Journal of VLSI Signal Processing vol 27, 69-79, 2001, "Enhancement of JPEG-Compressed Images by Re-application of JPEG", as applied in previous Non-Final Office Action) in view of Hallapuro et al (US 7,082,450B2, as applied in previous Non-Final Office Action), Winger et al (US 2004/0240556 A1, as applied in previous Non-Final Office Action), and Malvar (IEEE Transactions on circuits and systems for video technology vol 12, 598-603, July 2003, "Low Complexity Transform and Quantization in H.264/AVC", as applied in previous Non-Final Office Action).

Re Claims 1: Nosratinia discloses a method of processing an input image, comprising computing spatially-shifted forward transforms (Fig. 5 redundant expansion block,

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pages 71-73, section 3.1) of the input image, each forward transform being computed based on a denoiser transform  $Z$  having an associated transpose  $Z'$ , wherein a matrix multiplication between  $Z$  and  $Z'$  produces a diagonal matrix  $\Lambda$ ,  $Z = F(D)$ ,  $F$  specifies a mapping from coefficients of  $D$  to coefficients of  $Z$  (Note that if the mapping function  $F$  was a linear mapping, it is possible that  $F$  is just equal to  $D$ ), and  $D$  substantially corresponds to a frequency-domain transform / DCT (Fig. 5, pages 71-73, section 3.1); denoising the forward transforms based on nonlinear mappings derived from quantization values linked to the input image; computing spatially-shifted inverse transforms (Fig. 5 inverse redundant expansion, pages 73-74, section 3.2) of the denoised forward transforms, each inverse transform being computed based on  $Z$  and  $Z'$ ; and computing an output image (Fig. 5 enhanced image, pages 73-74, section 3.2) based on a combination of spatially-shifted inverse transforms.

However, Nosratinia does not disclose or fairly suggest exactly how each of the forward transforms are being computed based on a denoiser transform  $Z$ , how to denoise the forward transforms based on nonlinear mapping, and that  $F$  specifies a nonlinear mapping from coefficients of  $D$  to coefficients of  $Z$ .

Hallapuro discloses how each of the forward transforms / desired transform matrix (col. 8, lines 51-53) are being computed based on a denoiser transform  $Z$  /  $A$  (col. 8, lines 51-53). The applicant describes the forward transform  $B$  is  $ZXZ'$  and Hallapuro describes the desired transform matrix  $Y$  is  $AXA'$ . Note that the inverse transform would obviously be computed by inverting the above procedure, which is equivalent to what has been described by the applicant.

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Therefore, in view of Hallapuro, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Nosratinia's method by including the computation of deriving the forward transforms by a denoiser transform  $Z$  in order to require less operations when the transform is applied to digital data (see Hallapuro, abstract, lines 3-6).

However, Nosratinia as modified by Hallapuro still does not disclose or fairly suggest how to denoise the forward transforms based on nonlinear mapping and that  $F$  specifies a nonlinear mapping from coefficients of  $D$  to coefficients of  $Z$ .

Winger discloses how to denoise the forward transforms based on nonlinear mapping / threshold derived from quantization values linked to the input image (Fig. 5, page 3, cols. [0034]-[0034]).

Therefore, in view of Winger, it would have been obvious to one of ordinary skill in the art at the time the invention was made to further modify Nosratinia's method as modified by Hallapuro, by including a thresholding block to denoise the forward transform in order to reduce the white noise present and improve the rate-distortion (see Winger, abstract, lines 1-2).

However, Nosratinia as modified by Hallapuro and Winger fails to disclose or fairly suggest that  $F$  specifies a nonlinear mapping from coefficients of  $D$  to coefficients of  $Z$ .

Malvar discloses  $F$  / round specifies a nonlinear mapping / round from coefficients of  $D$  / DCT to coefficients of  $Z$  /  $H$  (see Malvar, page 599, equation 3).



Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to further modify Nosratinia's method and system, as modified by Hallapuro and Winger, using Malvar's teachings by including the nonlinear mapping to Nosratinia's mapping in order to improve compression efficiency and improve the PSNR while minimizing the computational complexity (see Malvar, page 599, left col., "For improved compression ...", page 602, left col., "In some applications ...", abstract).

As to claim 28, the claim is the corresponding system claim to claim 1 respectively. The discussions are addressed with regard to claim 1.

As to claim 29, the claim is the corresponding system [system comprising several means plus functions] claim to claim 1 respectively. The discussions are addressed with regard to claim 1.

The limitations as recited in claim 29 in lines 2-14, "means for computing spatially-shifted forward transforms", "means for denoising the forward transforms", "means for computing spatially-shifted inverse transforms", and "means for computing an output image" invoke 35 USC 112, 6<sup>th</sup> paragraph.

As to claim 30, the claim is the corresponding computer-readable medium storing a computer program claim to claim 1 respectively. The discussions are addressed with regard to claim 1.

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Re [newly added] Claim 31: Malvar further discloses  $Z_{ij} = \text{round} \{(3.5)D_{ij}\} /$

$H = \text{round}\{aHDCT\}$  is the rounding operator,  $Z_{ij}$  is the coefficient of  $Z$  in row  $i$  and column  $j$ , and  $D_{ij}$  is the coefficient of a discrete cosine transform in row  $i$  and column  $j$  (see Malvar, page 599, equation 3,  $D_{ij}$  is HDCT and  $H$  is  $Z_{ij}$ , the constant  $a$  of equation 3 may be 25 or 3.5 or any other type of constant).

Re Claim 2: Nosratinia further discloses  $D$  is a block-based linear transform (page 69, section 1, lines 1-3, Fig. 5 redundant expansion block, pages 71-73, section 3.1).

Re Claim 3: Nosratinia further discloses the spatially-shifted forward transforms comprises applying a forward transform operation to each of multiple positions of a blocking grid relative to the input image and the spatially-shifted inverse transforms are computed based on the relative positions of the blocking grid used to compute corresponding ones of the spatially-shifted forward transforms (Fig. 5 redundant expansion block, pages 71-73, section 3.1, the inverse transforms are just the inverse of the forward transforms as seen in Fig. 5).

Re Claim 4: Nosratinia further discloses  $D$  is a discrete cosine transform (page 69, section 1, lines 1-3, Fig. 5 redundant expansion block, pages 71-73, section 3.1).

Re Claim 5: Nosratinia further discloses  $D$  could be a two dimensional discrete cosine transform, but it is also obvious to one of ordinary skill in the art at the time the invention

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was made to establish the fact that a one-dimensional discrete cosine transform could also be applied because a 2-D DCT is just a combination of 1-D DCT's (page 69, section 1, lines 1-3, pages 75, paragraph 2).

Re Claim 6: Malvar further discloses the F may be an arithmetic operator / scalar to the DCT (page 599, col 2, paragraph 3-5, equation 3).

Re Claim 7: Malvar further discloses F may be a rounding arithmetic operator / rounding scalar to the DCT (page 599, col 2, paragraph 3-5, equation 3).

Re Claim 8: Nosratinia further discloses a quantizer Q which to one of ordinary skill in the art at the time the invention was made could be considered as F, where F is a mapping from coefficients of D to corresponding coefficients of Z having values selected from 0 and  $\pm 2^N$  where N has an integer value because this type of quantizer is a typical quantizer used in many fields of endeavor.

Re Claim 9: Malvar further discloses F is a mathematical operator corresponding to one of a rounding operator / round, a floor operator, a ceiling operator, and a truncate operator, and computing of the forward transform coefficients comprises applying the mathematical operator to coefficients of D weighted by respective scaling factors to obtain corresponding coefficients of Z (page 599, col 2, paragraph 3-5, equation 3).

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Re Claim 10: Malvar further discloses the forward transform coefficients comprises weighting coefficient of D by a common scaling factor (page 599, col 2, paragraph 3-5, equation 3).

Re Claim 11: Malvar further discloses F corresponds to a rounding operator applied to the weighted coefficients of D (page 599, col 2, paragraph 3-5, equation 3).

Re Claim 15: Nosratinia further discloses the input image corresponds to a decompressed version of an input image compressed based on a given quantization process and the forward transforms are denoised based on the given quantization process (Fig. 5 Q, pages 71-73, section 3.1). The Q in Fig. 5 shows the quantization process which may denoise the forward transforms.

Re Claim 16: Winger further discloses the forward transforms are denoised by setting to zero each of the forward transform coefficient with an absolute value below a respective threshold derived from a respective one of the quantization values linked to the input image and leaving unchanged each of the forward transform coefficients with an absolute equal to at least a respective threshold derived from a respective one of the quantization values linked to the input image (Fig 5, page 3, cols. [0033]-[0034]).

Re Claim 18: Nosratinia further discloses the output image is computed from a weighted combination of the inverse transforms (Fig. 5, pages 71-73, section 3.1). Nosratinia

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creates an average of the output image results for each shift component to create the enhanced image. When taking this average, it is assumed that the weighted factor is one, but the weighted factor if common could be anything and the average would be once again the same.

Re Claim 19: Nosratina further discloses the computed output image corresponds to an average of the inverse transforms (Fig. 5, pages 71-73, section 3.1). Nosratina creates an average of the output image results for each shift component to create the enhanced image.

Re Claim 20: Nosratina further discloses computing the output image comprises computing a base image / enhanced image from a combination of inverse transforms (Fig. 5, pages 71-73, section 3.1).

Re Claim 21: Nosratina further discloses the base image has pixels values corresponding to respective averages of values of corresponding pixels in the inverse transform (Fig. 5, pages 71-73, section 3.1). Taking the average of several images to produce one image is the same as producing one image having pixel values corresponding to respective averages of values of corresponding pixels in those several images.

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13. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nosratinia as modified by Hallapuro, Winger and Malvar as applied to claim 1 above, and further in view of Merhav et al (US 6,473,534 B1, as applied in previous Non-Final Office Action). The teachings of Nosratinia as modified by Hallapuro, Winger and Malvar have been discussed above.

However, Nosratinia as modified by Hallapuro, Winger and Malvar fails to disclose or fairly suggest the forward transforms are computed based on a factorization of Z.

Merhav discloses the forward transforms are computed based on a factorization of Z (col. 3-4, lines 32-37, lines 41-65).

Therefore, in view of Merhav, it would have been obvious to one of ordinary skill in the art at the time the invention was made to further modify Nosratinia's method, as modified by Hallapuro, Winger and Malvar by including a procedure of factorizing Z in order to increase the speed with acceptably minimal degradation of the final output.

14. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nosratinia as modified by Hallapuro, Winger and Malvar as applied to claim 1 above, and further in view of Yonekawa et al (US 5046121). The teachings of Nosratinia as modified by Hallapuro, Winger and Malvar have been discussed above.

However, Nosratinia as modified by Hallapuro, Winger and Malvar fails to disclose or fairly suggest sharpening the forward transform coefficients by increasing nonlinear transform parameters by respective factors that are larger for higher spatial



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frequency forward transform coefficients than for lower spatial frequency forward transform coefficients.

Yonekawa discloses sharpening the forward transform coefficients by increasing nonlinear transform parameters by respective factors that are larger for higher spatial frequency forward transform coefficients than for lower spatial frequency forward transform coefficients (see col. 9, lines 23-25 and 38-40, col. 3, lines 67-69, col. 4, lines 1-4, Yonekawa is analogous art because it is very similar to Winger who teaches claim 16 and Yonekawa also goes into setting to zero when an absolute value is below a respective threshold).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to further modify Nosratinia, as modified by Hallapuro, Winger, and Malvar, using Yonekawa's teachings by including the increasing and decreasing of nonlinear transform parameters by respective factors in order to achieve a high compression ratio without the deterioration of image quality (see Yonekawa, col. 1, lines 9-15).

15. Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nosratinia as modified by Hallapuro, Winger and Malvar as applied to claim 1 above, and further in view of Deshpande et al (US 2003/0081854 A1). The teachings of Nosratinia as modified by Hallapuro, Winger and Malvar have been discussed above.

However, Nosratinia as modified by Hallapuro, Winger and Malvar fails to disclose or fairly suggest computing a ringing correction image based at least in part on

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computed measures of local spatial intensity variability for pixels of each of the inverse transforms.

Deshpande discloses computing a ringing correction image based at least in part on computed measures of local spatial intensity variability for pixels of each of the inverse transforms (see Fig. 1, paragraphs [0054]-[0055], [0012]-[0013] and [0016]-[0017]).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to further modify Nosratinia, as modified by Hallapuro, Winger, and Malvar, using Deshpande's teachings by including a derringer to the inverse transforms in order to de-ring and edge sharpen in an efficient and fast implementation (see Deshpande, paragraphs [0012]-[0013] and [0016]-[0017]).

### ***Allowable Subject Matter***

16. Claim 12 is allowed.

17. Claims 23-26 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

18. Claim 27 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

***Conclusion***

19. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

**A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action.** In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

20. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Bernard Krasnic whose telephone number is (571) 270-1357. The examiner can normally be reached on Mon-Thur 8:00am-4:00pm and every other Friday 9:00am-3:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jingge Wu can be reached on (571) 272-7429. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Bernard Krasnic  
August 1, 2007



JINGGE WU  
SUPERVISORY PATENT EXAMINER